In *D. longifolia* there are 40 chromosomes in the nuclei of the sporophyte and 20 in those of the gametophyte, while in *D. rotundifolia* the numbers are 20 and 10 respectively. The chromosomes of *D. rotundifolia* are somewhat smaller, as well as less numerous. The behavior of the chromatin in a hybrid between two such forms is naturally of some importance.

In the hybrid, called *D. obovata*, the nuclei of the sporophyte show regularly 30 chromosomes, the anticipated number, but in the nuclei of spore mother cells the condition is unique. At the metaphase of the heterotypic mitosis in the pollen mother cell there appear 10 double chromosomes, presumably resulting from the pairing of 10 chromosomes of *D. longifolia* with the 10 of *D. rotundifolia*. Besides, there are 10 smaller single chromosomes, presumably belonging to *D. longifolia*. These 10 smaller chromosomes are irregularly distributed; some enter the daughter nucleus at the close of this mitosis, while others remain in the cytoplasm and may organize small nuclei, as in the well-known case of Hemerocallis. The behavior at the second mitosis is similar. The four spores of the pollen tetrad stick together, so that it is possible to determine the entire number of chromosomes in the four nuclei. Counting the chromosomes in the four nuclei and including those of the dwarf nuclei, the number is about 60. In any given spore the number ranges from 10 to 15, with 14 the most frequent. In a preliminary paper, ROSENBERG concluded that two of the spores of a tetrad belonged to *D. longifolia* and two to *D. rotundifolia*. This conclusion is now withdrawn, and differences in the size of spores is attributed to differences in the number of chromosomes. Sometimes a generative cell is formed, but usually the contents of the spore begin to disorganize before this stage is reached. At the time of shedding, the pollen grain has a normal exine, but the contents are usually dead.

In the formation of four megaspores from the mother cell the behavior is very similar to that just described. Occasionally, there is a well-developed embryo sac, but in most cases disorganization begins before the four-nucleate stage is reached.

ROSENBERG crossed the hybrid *D. obovata* with *D. longifolia*, and while usually there was no result, he obtained a few embryos. These contained at least 33 chromosomes, and in one case 37 were counted. The theoretical number would be 35.

The principal conclusions are (1) that the chromosome is an individual organ of the cell, and (2) reduction of chromosomes is brought about by a fusion of the chromosomes of the two parents.—CHARLES J. CHAMBERLAIN.

Mildew on Alchemilla species.—STEINER[4] has published an interesting paper on the specialization of *Sphaerotheca Humuli* (DC.) Burr on various species of Alchemilla. In addition to finding that the mildew on Alchemilla is confined to species of this genus, he also claims to be able to distinguish "minor biological species" within this genus of host plants. For example, conidia

4 STEINER, J. A., Die Spezialization der Alchemillen-bewohnenden *Sphaerotheca Humuli* (DC.) Burr. Centralbl. f. Bakt. etc. **21**²:677–726. 1908.

from *A. pastoralis* and *A. flexicaulis* are alike in infecting capacity, except that conidia from the former will only partially infect *A. pubescens*, and not *A. alpigena* at all; while conidia from *A. flexicaulis* partially infect *A. alpigena*, *A. pubescens* being entirely immune. Another case is that of the mildew on *A. impexa* which does not infect *A. alpina vera* or *A. nitida*, while conidia from *A. pastoralis* partially infect these hosts. Otherwise the two mildews are alike. STEINER further found that conidia from species of the *Vulgares* group will not produce full infection on alpine species, although conidia from alpine species produce full infection on the *Vulgares* species. STEINER supposes that the mildew on the alpine species came originally from *Vulgares* species and is only partially adapted to the new hosts. He also believes that the appearance of the mildew on alpine species is due to unfavorable environment.

STEINER also claims to have found "bridging species;" for example, conidia from *A. nitida* infect *A. impexa* but not *A. fallax*, while conidia from *A. impexa* will infect *A. fallax*. Thus the mildew is carried over from *A. nitida* to *A. fallax* through *A. impexa*. Similarly, *A. pastoralis* and *A. impexa* transfer the mildew from *A. connivens* and *A. pubescens* to *A. micans*. In addition to the fact that only a few tests were made, STEINER does not tell us what are the infecting powers of the mildews produced in this way on *A. micans* and *A. fallax*.

His conclusions would be more convincing if based on a larger number of tests. A large number of foreign infections also occurred in his experiments, no less than 71 foreign infections occurring in a total of 380 tests. The results are presented very clearly by means of a series of well-devised diagrams.—GEORGE M. REED.

Cytology of Florideae.—Cytological studies on the Florideae have been comparatively rare, partly on account of the difficulty in securing material, but principally on account of the difficult technic. Quite recently KURSSANOW has published[5] the results of his studies on three different forms of red algae: *Helminthora divaricata*, *Nemalion lubricum*, and *Helminthocladia purpurea*. His investigations did not deal with nuclear details, but rather with the morphology of fertilization of the carpogonium, the development of carpospores, and the structure of the chromatophores.

He failed to find a nucleus in the trichogyne of Nemalion and Helminthora; the trichogyne in these forms seems to be an extension of the carpogonium. He believes that such a condition is found only in the simplest forms of red algae, and agrees with the reviewer that a trichogyne with a nucleus, and yet without a partition wall between it and a carpogonium, as in Polysiphonia, may be a forerunner of the multicellular trichogyne found in the Laboulbeniaceae. The spermatium (sperm) has a single nucleus, agreeing with the reviewer's description of Polysiphonia. He thinks that a uninuclear condition in the sperm may perhaps be universal in red algae. In Nemalion, contrary to WOLFE'S results, the chromatophore has, in its center, a well-formed pyrenoid which is composed

[5] KURSSANOW, L., Beiträge zur Cytologie der Florideen. Flora **99**:311–336. *pls. 2, 3.* 1909.